More than three years ago we called attention to the possible consequences of the indiscriminate use of recombinant DNA techniques (Science 185, p. 303, 26 July, 1974). Although there was no scientific evidence that recombinant DNA experiments could be hazardous, we conjectured that the construction and propagation of supposedly novel DNA elements in Escherichia coli might result in the widespread dissemination of new genetic combinations. Recognizing a need for wider discussion and additional information, we recommended that certain experiments be deferred until the question of potential hazards and how to deal with them could be better evaluated.

In the ensuing four years the discussions, evaluations and experiences concerning recombinant DNA research have strikingly altered our assessment of the risks. More than 250 scientific investigations involving the construction and propagation of many different recombinant DNA molecules have been carried out in the United States and abroad with no indication of harm to humans or the environment. Where their ability to survive has been examined, organisms modified by recombinant DNA techniques do not compete successfully with their parental or wild-type organisms in the absence of a selection for the recombinant organism. Furthermore, there are increasing indications that supposedly novel recombinant DNA molecules can arise in nature by reactions akin to those used in the laboratory.

There is also virtually unanimous agreement by experts in infectious disease and epidemiology that strain K12, the variant

of E. coli widely used for recombinant DNA experiments, can neither colonize normal human or animal intestinal tracts, nor be transformed into infectious or pathogenic organisms by the addition of a bit of foreign DNA. In view of these reassuring developments and assessments, we regard our earlier apprehensions about the risks of recombinant DNA experimentation as being exaggerated and unwarranted.

During the past three years new insights about the structure and organization of genes in higher organisms have been obtained using recombinant DNA methods and these have radically altered our views on gene function in health and disease. Isolation or synthesis of genes coding for insulin, growth hormone and somatostatin are realities, not predictions. We believe that similar advances with genes coding for other therapeutically valuable proteins, for anti-bacterial and anti-viral vaccines, or for industrially important enzymes are forthcoming; these will accelerate the realization of practical benefits from DNA research.

In light of the impressive advances of scientific knowledge stemming from recombinant DNA research, the development of procedures to minimize the risks, and the widespread concensus that the unusual hazards postulated earlier for recombinant DNA have been exaggerated, we regard the enactment of legislation to govern and regulate recombinant DNA experimentation as undesirable and unnecessary. Legislation on this issue is not likely to increase significantly the safety of the experimentation; rather, its administration would create a costly

bureaucracy and inhibit basic research on important biological and medical problems. We are, therefore, persuaded that such special legislation would be detrimental to the long-term public welfare.

In our view there already exists effective mechanisms and sufficient authority in various statutes of the Public Health Service Act to both ensure safe conduct of recombinant DNA experimentation, and to alleviate the public's remaining anxieties about this line of research.

to ensure that recombinant DNA research is carried out safely.